

REMARKS/ARGUMENTS

Claims 3-5, 7-11 and 16-30 are pending. Claims 3, 6 have been amended.
Claims 23-30 have been added by amendment.

EXAMINER INTERVIEW

Applicants thank the Examiner for the courtesy extended during a telephone interview held on May 9, 2006 with Applicants attorneys, John Shimmick and Nena Bains. The participants discussed the obviousness-type double patenting rejections. Agreement was reached that the obviousness type double patenting rejection over USPN 5,858,477 will be overcome upon Applicants submitting a terminal disclaimer signed by an attorney of record. Agreement was reached that the obviousness type double patenting rejections over USPN's 6,827,977; 6,663,753; 6,764,579; 6,416,816; and 6,878,404 (assigned to Guardian Industries, hereinafter "Guardian Patents") have been overcome. More specifically, an assignment to United Module Corporation (hereinafter "UMC") of March 26, 2001 provided in an amendment of record entered on 3/15/06, explicitly includes assignment of any division, renewal, continuation in whole or in part, substitution, conversion, reissue, prolongation or extension thereof. Hence, the double patenting rejection is now moot.

Agreement was also reached that the 35 U.S.C. § 112 rejection of claim 7 would be overcome upon Applicants deleting the word "enhancing" from claim 7. Claim 7 is amended herein, and agreement was reached that amended claim 7 and all claims depending therefrom are in condition for allowance, pending an updated search. Agreement was reached that the § 112 rejection of claim 3 will be removed in light of in light of Applicants amending claim 3 to recite "... energizing the ions to form a stream having a substantially uniform impact energy distribution and a uniform weight distribution from the plasma straight toward the substrate so that the carbon from the ions is deposited on the substrate, ~~and which promotes wherein the~~ uniform impact energy distribution and the uniform weight distribution promote formation of more than 15% sp³ carbon-carbon bonds." Agreement was reached that proposed claim 3 was

not as anticipated by USPN 5,374,378 (hereinafter "Rabalais") because claim 3 recites "from the plasma straight toward the substrate" and Rabalais deflects the ion stream.

REJECTIONS UNDER 35 U.S.C. § 112

As set forth above in the Interview Summary, Applicants have amended claim 7 to delete the word "enhancing", so that any rejection of claim 7 as "enhancing" being vague and indefinite has been overcome. With regard to claim 3, as set forth in the Interview Summary, Applicants have amended claim 3 to recite a "substantially uniform impact energy distribution" and a "substantially uniform weight distribution" so that any rejection of claim 3 as "uniform" being vague and indefinite has been overcome.

OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTIONS BASED ON USPN 5,858,477

As set forth above in the interview summary, enclosed herewith is a terminal disclaimer signed by Mark Barrish, an attorney of record, so that the obviousness type double patenting rejection over USPN 5,858,477 has been overcome.

REJECTIONS UNDER 35 U.S.C. §§ 102(e) and 103(a) BALDWIN

Claims 3-5, 16-17 & 20 were previously rejected under 35 U.S.C. §§ 102(e) and 103(a) as allegedly anticipated or in the alternative as allegedly obvious over USPN 5,616,179 (hereinafter "Baldwin"). Applicants respectfully submit that the invention recited in amended claim 3 is allowable over Baldwin.

Claim 3 recites a method for use in a plasma deposition apparatus to deposit carbon on a substrate with an ion stream in which the ion stream has a substantially uniform energy distribution and a substantially uniform weight distribution. This substantially uniform energy distribution and weight distribution **promote formation of more than 15% sp³ carbon-carbon bonds**. The ion stream is straight from the plasma toward the substrate. The use and advantages of a substantially uniform energy distribution and weight distribution to promote formation of more than 15% sp³ carbon-carbon bonds can be understood with reference to Figs. 3A, 3D and 3F and the associated text on page 12, paragraph 49; page 14, paragraph 57 to page 15, paragraph 60; and page 16 paragraphs 63 and 64.

In contrast to the currently claimed energy and weight distributions to promote formation of more than 15% sp^3 carbon-carbon bonds, Baldwin relies on the presence of hydrogen gas in the chamber. As Baldwin explains,

[c]arbon atoms can assume either a three fold planar bonding pattern (sp^2 hybridization) or a four fold tetrahedral bonding pattern (sp^3 hybridization). Graphite has three-fold sp^2 bonding whereas diamond has four-fold sp^3 hybridization. Baldwin, col. 2, lines 5-10.

During deposition of diamond like carbon, **hydrogen gas is introduced to the chamber to prevent formation of graphite like chemical bonds.** Baldwin, col. 4, lines 38-42 and col. 9, lines 33-36. Thus, Baldwin describes the use of hydrogen to promote the formation of sp^3 carbon-carbon bonds by introducing hydrogen in to the chamber to prevent the formation of graphite like chemical bonds.

Baldwin seeks to promote the formation of carbon sp^3 hybridization with hydrogen gas and fails to show energizing ions to form a stream having a substantially uniform impact energy distribution and a substantially uniform weight distribution to promote the formation of (more than 15%) sp^3 carbon-carbon bonds as recited in claim 3. With respect to weight distribution, Baldwin describes several species of ions (H^+ , H_2^+ , CH_x and CH_4^+) arising from a feed gas (e.g. methane), such that the ion stream of Baldwin does not have a uniform weight distribution. Col. 6, lines 34-52. In direct contrast to the substantially uniform energy distribution of claim 3, Baldwin instead describes a "**ranging energy distribution**" of the hydrocarbon based positive ions in the beam as an **important feature** which allegedly contributes to that invention. Col. 3, line 65 to col. 4, line 4 (emphasis added). Although Baldwin teaches using a "broad beam" to irradiate a substrate with uniformity, this use of uniformity refers to the geometric size of the beam in relation to the substrate. Col. 9, lines 18-21. Baldwin does not remotely suggest, and at least arguably teaches away from, the substantially uniform distribution of the energy of the ions within the stream and substantially uniform distribution of weight of the ions in the stream as recited in claim 3.

Applicants respectfully submit that Baldwin contradicts any allegation of inherency of the claimed energy and weight distributions. To establish inherency the extrinsic evidence must make clear that the missing descriptive matter is **necessarily present** in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. MPEP 2112, In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51.

Baldwin appears to allege that hydrogen gas can be used to promote formation of diamond like sp^3 carbon with a range of different energies and ions of very different weights. The use of a substantially uniform energy distribution and a substantially uniform weight distribution to promote formation of sp^3 carbon is contrary to the actual weights and energies described by Baldwin, and there certainly is no basis in the record for asserting that the claimed energies and weights would inherently be present despite the actual disclosure of the Baldwin reference. Therefore, the use of a substantially uniform impact energy distribution and a substantially uniform weight distribution to promote formation of more than 15% sp^3 carbon-carbon bonds is not inherent in Baldwin.

As all of the elements recited in claim 3 have not been taught nor suggested in Baldwin, Applicants respectfully request that these rejections have been overcome.

REJECTION UNDER 35 U.S.C. § 103(a) LEWIN IN COMBINATION WITH BALDWIN OR RABALAIS

Claims 3, 5 & 19-20 were previously rejected as allegedly obvious under § 103 over USPN 4,486,286 (hereinafter "Lewin") in combination with Baldwin or Rabalais. Applicant's respectfully disagree.

As set forth above, Baldwin teaches the use of hydrogen to promote the formation of sp^3 carbon and fails to describe or suggest the use of a substantially uniform impact energy distribution and a substantially uniform impact weight distribution to promote the formation of more than 15% sp^3 carbon-carbon bonds. Like Baldwin, Lewin teaches the use of at least one gas, for example hydrogen gas, to preferentially remove graphite from the substrate by chemical

sputtering. Abstract, Col. 2, lines 25-27, lines 41-49 and claim 1. As set forth above, the removal of graphite with hydrogen allegedly promotes the formation of sp^3 carbon. Despite widely ranging energies and weights. Therefore, Lewin also fails to show the use of a substantially uniform impact energy and a substantially uniform impact weight to promote the formation of more than more than 15% sp^3 carbon-carbon bonds.

Rabalais teaches that an important feature of that invention is an ion beam which is mass selected. Col. 5, lines 10-13 and col. 12, lines 7-11. To achieve this mass selection, Rabalais uses a 60-degree sector electromagnet and a ceramic isolator. Col. 12, lines 24-26, Fig. 1. **The individual ions are mass selected** by varying current through the magnetic sector, and **only one ion type is allowed to impinge on the target**, for example $^{12}C^+$. Col. 15, lines 50-52, col. 16, lines 35-37, col. 17, lines 28-32.

Applicants respectfully submit that the proposed combination fails to include all the elements of the claims, because none of these reference teach how to produce a substantially uniform impact energy distribution and a substantially uniform weight distribution with a plasma stream **straight from the plasma source toward the substrate** to promote formation of more than 15% carbon-carbon sp^3 bonds as recited in claim 3. As set forth above, Baldwin/Lewin fail to teach how to achieve a substantially uniform impact energy distribution and a substantially uniform weight distribution to promote formation of more than 15% sp^3 carbon-carbon bonds. Rabalais seeks to provide a mass selected ion beam with a narrow energy spread by **deflecting the beam**. Rabalais fails to teach how one could make a straight beam which provides a substantially uniform impact energy distribution and a substantially uniform weight distribution to promote the formation of more than 15% carbon sp^3 bonds as recited in claim 3. Thus, Rabalais combined with Baldwin/Lewin fail to show how one would make an ion stream which is straight from the plasma source toward the substrate and in which the ion stream has a substantially uniform impact energy distribution and a substantially uniform weight distribution to promote formation of more than 15% sp^3 carbon-carbon bonds.

For the above reasons, claim 3 is allowable over Rabalais in combination with Baldwin/Lewin.

OBVIOUSNESS-TYPE DOUBLE PATENTING ASSIGNEE GUARDIAN INDUSTRIES

Applicants note, as set forth above in the interview summary, that the obviousness type double patenting rejections over the Guardian Patents have been overcome as the assignment to UMC, provided in an amendment of record entered on 3/15/06, explicitly includes assignment of any division, renewal, continuation in whole or in part, substitution, conversion, reissue, prolongation or extension thereof. Therefore, the present application is owned by UMC such that ownership of the present application and the Guardian Patents is different.

NEW CLAIMS 23-36

New claims 23-36 have been added to more fully claim embodiments of the present invention. Claims 23-28 depend on claim 3 and are allowable as depending on an allowable claim and reciting additional novel combinations of elements. Independent claim 29 is allowable for reasons similar to those set forth above with regard to claim 3. Claims 30-36 depend on claim 29 and are allowable as depending on an allowable claim and reciting additional novel combinations of claim elements.

CONCLUSION

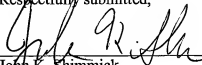
In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

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Amendment after Final dated 1-Jun-06
Amendment under 37 CFR 1.116 Expedited Procedure
Examining Group 1762

PATENT

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650 326-2400.

Respectfully submitted,



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